



Biosorption of lead using *Penicillium notatum* dead biomass from aqueous solutions

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ABSTRACT

Lead is one of the stable and biodegradable pollutants released from industrial, agricultural and technological development activities more than the permitted level in the environment. This metal, due to its toxicity, even at low concentrations, has adverse effects on the environment and health of living organisms. The aim of this study is to investigate the bio-absorption of lead by the fungus *Penicillium notatum* in aqueous solutions. For this purpose, the fungus *Penicillium notatum* PTCC 5074 was prepared from the Iranian Scientific Research Organization as lyophilisation and to culture and reproduce it in the culture medium of potato dextrose agar and sabouraud dextrose broth. In this study, the effect of some parameters such as lead concentration, ion intensity, biomass concentration, temperature and contact time on the rate of adsorption of lead by abiotic biomass at pH = 5 were evaluated. The maximum absorption rate was 180.75 mg g⁻¹ under optimal conditions (concentration of metal = 228 mg L⁻¹, ion intensity = 43.2 mg L⁻¹ Ca²⁺, biomass concentration = 1.2 g L⁻¹ of dry weight of biomass, temperature = 33°C, and contact time = 105 min). Absorption data were better fitted by Langmuir model ($R^2 = 0.9820$). Also, due to the thermodynamic constants, it was found that lead absorption process is thermally abiotic by a biomass. Gibbs free energy values (ΔG) showed that all absorption processes are spontaneous and physical. The false quadratic equation ($R^2 = 1$) has the best compatibility with regard to kinetic data. BET, SEM and EDX tests were also used to determine the biomass characteristics.

Keywords: Biosorption; Lead; *Penicillium notatum*

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